NORTH CAROLINA

Introduction and General Description

North Carolina prides itself upon its diversity both ecologically and culturally. Its rich reputation of pristine beaches, wide seafood-filled sounds and estuaries, sprawling floodplains, sweltering Sandhills with swaying longleaf pines, rolling hills, winding rivers, crashing waterfalls, and awesome mountain peaks has provided home for such species as sea turtles, brown pelicans, Venus flytraps, blue crabs, ducks, red-cockaded woodpeckers, bald eagles, fresh water mussels, and Indiana bats. Ironically, it is these types of Federal trust resources and the habitats they depend upon, that have attracted so many people and businesses to North Carolina. Today urban sprawl, growing industry, and associated development threaten the very resources that have made North Carolina so appealing and successful.

The Coastal Plain, Piedmont, and Mountain regions of North Carolina house 8,175 plant and animal species. Of those, 1,402 are presently considered rare, threatened, or endangered according to Federal and State agencies and private conservation organizations. The rivers of North Carolina's Eastern Seaboard support striped bass, a commercial and recreational fish that holds an important position in the aquatic food web. The once imperiled species, commercially exploited in the late 1800s, is now recovering through harvest management. North Carolina also provides habitats essential for many migratory birds such as ducks, geese, swans, songbirds, hawks, and shorebirds. Over half of the Atlantic Flyway population of tundra swans winter in North Carolina. In the Piedmont, where Daniel Boone once lived and explored and passenger pigeons darkened the sky, today interstates, shopping centers, and neighborhoods prevail. But, even now this area still provides breeding and wintering grounds for species such as bald eagles and several rare plants. Among the coniferous and mature northern hardwood forests of the Appalachian mountains, Carolina northern flying squirrels feed on lichens, fungi, seeds, sap, and insects through the night.

Ten National Wildlife Refuges, covering 391,000 acres in North Carolina, are protected and managed for many of the State's important species. Other government agencies such as Department of Defense, National Park Service, U.S. Forest Service, North Carolina Wildlife Resources Commission, and North Carolina Department of Parks and Recreation manage and protect valuable conservation lands.

An active system of Land Trusts, the North Carolina Chapter of The Nature Conservancy, and many other non-profit organizations also manage and protect many of North Carolina's valuable ecosystems.

The fact remains that 90 percent of the land in North Carolina is privately owned. Without conservation efforts on private lands, our trust resources would simply not survive. Private landowners in North Carolina want to conserve and restore habitats, but often lack the technical and financial support necessary to manage their land so that it can support wildlife and meet their needs financially. The U.S. Fish & Wildlife Service's Partners for Fish and Wildlife Program helps satisfy this need.

Opportunities abound for restoration of forested wetlands in North Carolina. ***Photo: USFWS***

Habitats of Special Concern

The U.S. Fish & Wildlife Service's Partners for Fish and Wildlife Program in North Carolina assists with the restoration and enhancement of every ecosystem in the State that benefits Federal trust resources. Wetland systems such as mountain bogs, spring seeps, rivers, streams, flood plains, bottomland hardwoods, pocosins, Carolina bays, and marshes are all candidates for restoration through Partners for Fish and Wildlife. In addition, other non-wetland habitat types in North Carolina are important to trust resources such as longleaf pine, upland hardwoods, and native grasslands. Some Partners projects are educational in nature, providing the necessary materials and opportunities for children and adults to learn the significance of the State's natural resources. Most of the Partners projects have occurred in the following four habitat types:

Forested Wetlands - bottomland hardwoods, non-alluvial swamp forest, pocosins

Bottomland hardwoods, occurring along the brown water streams of North Carolina, receive rich layers of soil during frequent over bank flooding events and thus are some of our most productive forested wetlands. Important tree species are the many wetland oaks, sugarberry, elms, green ash, red maple, box elder, and sweetgum; with water tupelo and cypress in the lower, wetter zones.

Non-alluvial swamp forests occur in broad "flats" with poorly defined drainage systems. They do not receive "over bank" flooding, but are primarily flooded by rainfall. These forested wetlands, along with pocosins, once covered thousands of square miles of eastern North Carolina. Dominant tree species are black gum, loblolly bay, red maple, sweet gum, cypress, and Atlantic white cedar. This assemblage of forested wetland types are important for high priority species such as cerulean warbler, Swainson's warbler, prothonotary warbler, black-throated green warbler, American woodcock, yellow-throated warbler, red wolf, and black bear.

Longleaf Pine

The longleaf pine ecosystem that once covered 92 million acres of the southeastern United States from Texas to Maryland included over 9 million acres of central and eastern North Carolina. Remnants of longleaf pine in North Carolina still play a vital role for many wildlife species. This naturally diverse ecosystem supports several federally listed species including red-cockaded woodpeckers, Micheaux's sumac, American chaffseed, and rough-leafed loosestrife. It is also an important habitat for migratory birds such as Bachman's sparrow, pine warbler, and brown-headed nuthatch.

Management of longleaf pine ecosystems. ***Photo: USFWS***

Endangered Schweinitz"s sunflower on a remnant Piedmont prairie. ***Photo: USFWS***

Piedmont Prairies

From 1540 to 1750, European explorers and traders in the Piedmont region of North and South Carolina reported many prairie-like openings ranging in size up to 25 miles across. Historical and meteorological evidence suggests that these prairies were primarily the products of Native American burning and agriculture. Piedmont prairies, also known as

grasslands, early successional habitat, savannahs, or xeric hardpan forests contain a whole suite of native bird and rare plant species such as Schweinitz's sunflower and smooth coneflower (both federally-listed endangered species), Georgia aster, loggerhead shrike, savannah sparrow, field sparrow, prairie warbler, Henslow's sparrow, and Northern bobwhite.

Streams and Riparian Areas

Steams and surrounding riparian areas are rich and diverse in North Carolina. They perform many ecological functions such as regulating stream flow, storing water, removing harmful materials, and providing habitat for aquatic and terrestrial plants and animals. Steams and riparian areas in North Carolina are essential habitat for many imperiled species such as the federally-listed Appalachian elktoe mussel, littlewing pearlymussel, spotfin chub, and Virginia spiraea. Many other Federal species of concern depend on water quality and the condition of streams for their existence.

Threats

Large scale land clearing in North Carolina has created many problems for wildlife and water quality, especially in the coastal region. These problems include complete destruction of forested wetlands (i.e., conversion to agriculture), drainage and conversion to loblolly pine plantations, drainage and destructive logging techniques, release of nutrients and mercury due to oxidation of organic soils, and habitat fragmentation. In a study on wetland losses done by the USFWS National Wetland Inventory, North Carolina stood out among all southeastern states with the highest acreage of net wetland loss, an estimated 1.2 million acres. Nearly all the losses were from forested and scrub/shrub wetlands and were concentrated in the "Coastal Flats" region of North Carolina.

Threats to the longleaf pine ecosystem and Piedmont prairies are the exclusion of fire, urban sprawl, development, and conversion to loblolly pine plantations. Fire, an essential element in the management and maintenance of the longleaf pine ecosystem and native prairies, has been largely squelched due to a lack of understanding and education about its importance and difficulty of burning at the urban interface.

Riparian (streamside) areas have been abused and misused for decades. Timbering and various agricultural practices have traditionally taken place in riparian habitat. Negative effects include sedimentation from bank sloughing, livestock tromping, and de-vegetation; over-eutrification from livestock access, fertilizers used in near-stream row cropping, and lack of filtering buffers; pollution from multiple sources; and various developmental activities. All of these activities contribute silt, nutrients, and pollutants to streams, thus affecting their living inhabitants.

Livestock in streams and riparian areas cause bank erosion and sedimentation

Photo: USFWS

Conservation Strategies

Forested Wetlands

Restoring forested wetlands begins by restoring the hydro-period (water access and duration). This is accomplished by plugging drainage canals with earthen plugs and/or installing water control structures. Sometimes dikes have to be built to allow site specific restoration without re-flooding neighboring lands. Though variable, the average cost to restore the water to a site is between $10 to $80 per acre. The next step is reforestation. Reforestation costs range from $125 to $300 per acre, with the largest variable being site preparation for planting.

Longleaf Pine

Restoration and enhancement of longleaf pine is relatively easy. The reintroduction of fire, controlling invasive hardwood species, and planting the longleaf pine trees is a straight forward process with known successful results. Even reintroduction of native understory herbaceous plants is becoming a reality. Restoration costs vary widely since some sites only need the reintroduction of fire while others require mechanical site preparation or the removal of hardwood trees by hand. Costs range from $30 to $175 per acre.

Prairies

Prairie restoration can be accomplished by applying management techniques such as burning or mowing, thinning overstory vegetation and re-planting or transplanting native species. Depending on the site and need, restoration costs range between $30 (just burning) and $200/acre (full restoration with materials and labor).

Stream Restoration

Fire restores Piedmont Prairies ***Photo: R. Hansard***

Suther Prairie after a burn. ***Photo: USFWS***

Streams that are highly degraded can be restored using bioengineering techniques that can put a channelized stream back to its original meandering path and recreate pools and riffles. Costs to plan and implement such a restoration average $50 to $125/linear foot of stream. Techniques such as riparian fencing, tree plantings, streambank

Bioengineering techniques such as the placement of J Hooks are used to restore streams.
Photo: USFWS

Stabilization, livestock stream crossings, and alternate watering sources (e.g., water tanks, ponds) are less expensive and easier to implement and can have a significant positive impact.

One-on-one conversations with the landowner is a critical component of the restoration strategy as landowners must first understand how their habitat type is designed to function naturally, the benefits it has in its natural state, and how we can accomplish restoration economically and in a way that is compatible with farming operations. Demonstration sites, interpretive materials, and publications are often used for education.

Partners

Atlanta Botanical Garden
Atlantic Coast Joint Venture
Audubon Society
Cape Fear River Watch
Carolina Lands Conservancy Network
Catawba College
Catawba Lands Conservancy
Champion International
Conservation Trust for North Carolina
Cooleemee Historical Association
Core Sound Museum
Ducks Unlimited
Environmental Impact RC&D, Inc.
Environmental Protection Agency
Farm Service Agency
Fayetteville Public Works Commission
HARP, Inc.

Janirve Foundation
Land Trust for Central North Carolina
Land Trust for the Little Tennessee
Little Tennessee Watershed Association
Mecklenburg Co. Park & Recreation Dept.
Mitchell River Coalition
National Committee for the New River National Fish and Wildlife Foundation
National Park Service
National Tree Trust
Natural Resources Conservation Service
NC Clean Water Management Trust Fund
NC Coastal Land Trust
NC Cooperative Extension Service
NC Department of Cultural Resources
NC Forest Service
NC Herpetological Society
NC Natural Heritage Program
NC Parks and Recreation Department
NC State Museum of Natural Sciences
NC State University
NC Stream Restoration Program
NC Stream Restoration Institute
NC Wesleyan College
NC Wildlife Resources Commission
NC Zoological Park
Northeast Tarheel Conservancy
Pamlico-Tar River Foundation
Piedmont Land Conservancy
Pilot View R C&D, Inc.
Plume Creek Corporation
Quail Unlimited
Red Apple
Roanoke/Cashie River Center
Roanoke/ Chowan Community College
Roanoke River Basin Regional Council
Salisbury Foundation
Soil & Water Conservation Districts
Tennessee Valley Authority
The Nature Conservancy, NC Chapter
Town of Pinebluff
Town of Troy
Town of Windsor
Triangle Land Conservancy
University of North Carolina at Asheville
University of North Carolina in Charlotte
University of North Carolina at Greensboro
U.S. Forest Service
Virginia Power
Western North Carolina RC&D Council
Z. Smith Reynolds Foundation
Zoo Atlanta

Accomplishments

The Partners for Fish and Wildlife Program began in the early 1990's by North Carolina's National Wildlife Refuges where wetlands were developed for migratory birds. The program evolved to include many habitat types throughout the State and many creative restoration techniques.

- Over 7,000 acres of uplands and wetlands restored
- 23 miles of streams restored
- Over 140 projects have been done under the Partners for Fish and Wildlife Program.

Worley Creek in Watauga Co., NC before stream restoration. ***Photo: USFWS***

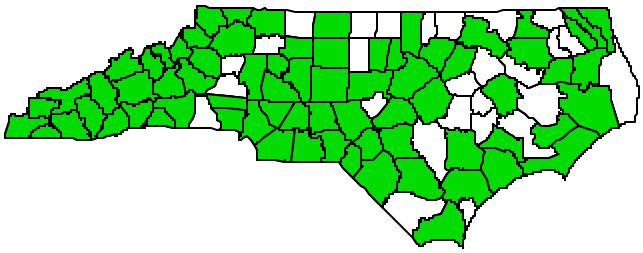
Worley Creek after stream restoration.

Photo: USFWS

Future Needs

Opportunities abound for restoration in North Carolina.

- Forested wetland restoration is needed on approximately 580,000 acres.
- There are approximately 100,000 acres of degraded longleaf pine that need of restoration and another 100,000 acres could be replanted to longleaf pine habitat.
- There is potential to restore 1,000 acres to native Piedmont prairies.
- About 25,000 miles of all North Carolina steams and streambanks are in need of restoration.
- In addition to the featured habitat types, there are over 1 million acres of restoration and enhancement needs for other wetland types such as Carolina bays and mountain bogs and upland types such as hardwood forests.
- The need for an educational component



Counties in green show Partners for Fish and Wildlife activities including restoration projects and technical assistance.

associated with these projects grows with the growing human population.

Longleaf pine before restoration.

Photo: S. Miller

A restored longleaf pine ecosystem.

Photo: S. Miller

CONTACT

John Ann Shearer
Partners for Fish and Wildlife Program
U.S. Fish and Wildlife Service
551-F Pylon Drive, POB 33726
Raleigh, NC 27636-3726
919 856-4520 (Fax) 919 856-4556

July 2001